Research Paper | Computer Science | E-ISSN No : 2454-9916 | Volume : 2 | Issue : 12 | Dec 2016

SURVEY ON CLUSTER FORMATION ALGORITHMS FOR LOAD BALANCING IN CLOUD COMPUTING

Utkarsh Urphate [1] | Santosh Shelake [2] | Suresh Rathod [2]

[1] ME Scholar, CSE, SAE, Kondhwa, Pune, India- 411048.

[2] Asst.Prof.,CSE, SAE, Kondhwa ,Pune, India - 411048.

ABSTRACT

In the 20th century, cloud computing plays an crucial role to prove a solution for the improve the performance of the load balancing. In this paper we are describing the load balancing algorithms with respect to various factors like execution time, waiting time, response time, turnaround time. This paper illustrates also various load balancing algorithms on architecture wise. We also proposed approach that mainly ensures that a better performance with flawless load balancing.

KEYWORDS: Cloud computing, load balancing, execution time, cluster, performance.

1. INTRODUCTION:

Cloud computing is an emerging technology that promises to change the paradigm of computer services. Besides, the underlying ideas and concepts of cloud computing are not new. Cloud computing is a model for delivering information technology services in which resources are retrieved from the internet through web-based tools and applications rather than a direct connection to a server.It has been viewed by many business people as a way to gain new capabilities quickly without having to work with—and get bogged down by—the internal IT department. Data and software packages are stored in servers; however, a cloud computing structure allows access to information as long as an electronic device has access to the web.

In this way, Buyya R. et al define cloud computing as "a type of parallel and distributed system consisting of a collection of interconnected and virtualized computers that are dynamically provisioned and presented as one or more unified computing resources based on service-level agreements" [1].Let us consider the example, figure out what you want to do, find a service provider that can help you do it, grab your credit card, and pay as you go. No arduous development process. No large capital outlays to be approved. No hardware and software to maintain. You are probably using cloud computing right now, even if you don't realize it. If you use an online service to send email, edit documents, watch movies or TV, listen to music, play games or store pictures and other files, it is likely that cloud computing is making it all possible behind the scenes. [2]The first cloud computing services are barely a decade old, but already a variety of organizations from tiny startups to global corporations, government agencies to non-profits are embracing the technology for all sorts of reasons. For line-of-business and functional leaders, this seemed like a great model. Cloud computing and storage solutions provide users and enterprises with various capabilities to store and process their data in either privately owned or third-party data centers. As well, it enables organizations to focus on their core businesses instead of spending time and money on computer infrastructure. In this paper, we are describing the various algorithm strategies, load balancing techniques, objectives.

Service Models

A. SAAS:

Cloud-based applications or software as a service run on distant computers "in the cloud" that are owned and operated by others and that connect to users' computers via the internet and, usually, a web browser.

The benefits of SaaS

- You can sign up and rapidly start using innovative business apps
- Apps and data are accessible from any connected computer
- No data is lost if your computer breaks, as data is in the cloud
- The service is able to dynamically scale to usage needs.

Fig. 1.1 SAAS

B. PAAS:

Platform as a service provides a cloud-based environment with everything required to support the complete lifecycle of building and delivering web-based (cloud) applications—without the cost and complexity of buying and managing the underlying hardware, software, provisioning, and hosting.

The benefits of PaaS:

- Develop applications and get to market faster
- Deploy new web applications to the cloud in minutes
- Reduce complexity with middleware as a service

Fig. 1.2 PAAS

C. IAAS

Infrastructure as a service provides companies with computing resources including servers, networking, storage, and data center space on a pay-per-use basis.

The benefits of IaaS

- No need to invest in your own hardware
- Infrastructure scales on demand to support dynamic workloads
- Flexible, innovative services available on demand

Fig. 1.3 IAAS

D. PUBLIC CLOUD

Public clouds are owned and operated by companies that offer rapid access over a public network to affordable computing resources. With public cloud services, users don't need to purchase hardware, software, or supporting infrastructure, which is owned and managed by providers.

Key aspects of public cloud

- Innovative SaaS business apps for applications ranging from customer resource management (CRM) to transaction management and data analytics
- Flexible, scalable IaaS for storage and compute services on a moment's notice
- Powerful PaaS for cloud-based application development and deployment environments

Fig. 1.4 PUBLIC CLOUD

E. PRIVATE CLOUD

A private cloud is infrastructure operated solely for a single organization, whether managed internally or by a third party, and hosted either internally or externally. Private clouds can take advantage of cloud's efficiencies, while providing more control of resources and steering clear of multi-tenancy.

Key aspects of private cloud

- A self-service interface controls services, allowing IT staff to quickly provision, allocate, and deliver on-demand IT resources
- Highly automated management of resource pools for everything from compute capability to storage, analytics, and middleware
- Sophisticated security and governance designed for a company's specific requirements

Fig.1.5 PRIVATE CLOUD.

2. LOAD BALANCING:

Load balancing is dividing the amount of work that a computer has to do between two or more computers so that more work gets done in the same amount of time and, in general, all users get served faster. A load balancer sits between the client and the server farm accepting incoming network and application traffic and distributing the traffic across multiple backend servers using various methods. Whether you are responsible for a single application or Website, a large Internet property or a public or private cloud, Array server load balancing delivers the performance, scalability, features and value essential for accelerating your business

Load balancers provide the bedrock for building flexible networks that dynamically adjust to changing needs. A load balancer acts as the "traffic cop" sitting in front of your servers and routing client requests across all servers capable of fulfilling those requests in a manner that maximizes speed and capacity utilization and ensures that no one server is overworked, which could degrade performance They improve performance, reliability and security for many types of network traffic and services, including applications [3]. At the same time, networks must evolve to keep up with virtualized and cloud infrastructure, as well as applications that are consumed through mobile devices from unpredictable locations. In addition, integrated traffic management and application acceleration functions including SSL acceleration, adaptive compression, dynamic caching, connection multiplexing, content routing and quality-of-service provide unparalleled control over application traffic and the ability to significantly improve application performance.

It's technique to efficiently distributing incoming network traffic across a group of backend servers, also known as a server farm or server pool. Load balancing can be implemented with hardware, software, or a combination of both. . Load balancing improves responsiveness and increases availability of applications. By balancing application requests across multiple servers, a load balancer reduces individual server load and prevents any one application server from becoming a single point of failure, thus improving overall application availability and responsiveness.

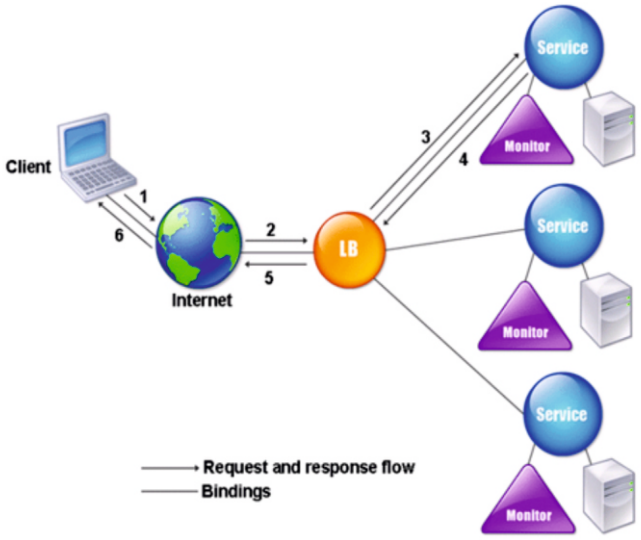

Fig 2.1OVERVIEW OF LOAD BALANCER

Load balancing is the most straightforward method of scaling out an application server infrastructure. As application demand increases, new servers can be easily added to the resource pool and the load balancer will immediately begin sending traffic to the new server.

3. PARAMETERS FOR LOAD BALANCING:

The load balancer matches task resource specific requirements with capacity range of cluster in order to assign the task to [4] appropriate cluster.There are some parameters which are considered important for a load balancing algorithm.

a) Response time: The time taken by the load balancer to task.

Response time=Allocated time – generated time.

b) Execution time: The time taken by the Vm to process the task.

Execution time= Task size/CPU speed.

c) Turnaround time: Total time taken by the system from submission of request to the production of the request called Turnaround time.

Turnaround time=Completion time-generated time

4. REVIEW OF LOAD BALANCING ALGORITHMS:

There are load balancing have been proposed. Some of them are discussed here as follows:

- **Virtual Partition in Hadoop Cluster:** This method is plays an very crucial role in the load balancing. Hadoop is an open-source software framework that licensed under the Apache, which consists of HDFS (Hadoop Distributed File System) .Fairness in data partitioning is an important performance factor for Reduce task execution. The hash-partition in native Hadoop can cause load unbalance for reduce tasks' input. Inthis paper, [4]we present a load balancing method in which the maps' output keys are partitioned to different virtual partitions firstly and an algorithm named LBVP for ensuring eachreduce task has balanced input data.

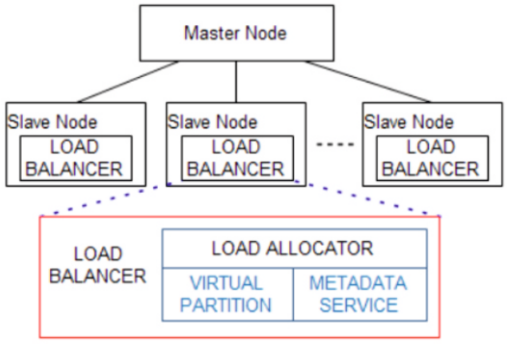

Fig. 4.1 Block diagram of Virtual Partitioning.

The architecture of load allocation solution is depicted in Figure 1 which is mainly composed of the three modules: one is LA (Load Allocator), the other is VP (Virtual Partition), and another is MS (Metadata Service). VP is designed to fine-grained partitioning the output load of Map function; MS is responsible for collecting the metadata from all VPs executed in other Slave Nodes and provides metadata service for LA.

- **A Modified Round-robin Load-balancing Algorithm:** The web is of great importance as it serves as the standard interface for accessing remote services, for the developing the most secure and the very reliable interface between the server and the load balancer. The exponential growth of the Internet, coupled with the increasing web servers that are capable of serving the over 100 million Internet users. a cluster-based web system is composed of N sever machines, which are connected through a high-speed network in order to solve user requests.

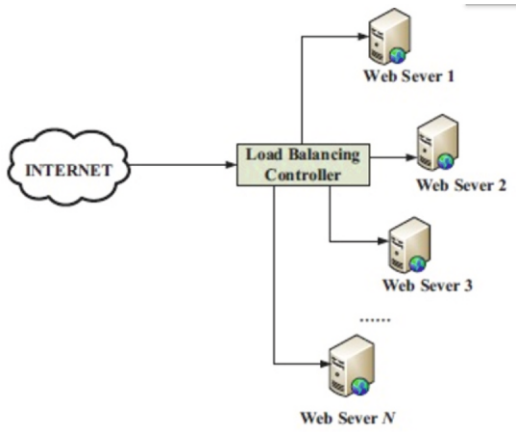

Fig. 4.2.Round robin algorithm.

Although a cluster has large numbers of web servers, itonly utilizes one hostname and one virtual IP address to provide a single interface for outside users. So it is necessary to have a mechanism that controls the whole requests of the site and to mask the service distribution among all the servers.

One of the most important components is the load-balance controller, which routes the load and dispatches client requests to all the server nodes. Usually, we deploy our load-balancing algorithm into load-balance controller to execute logic.

5. CONCLUSION:

In this paper, we deal with the concepts of cloud computing, load balancing, various parameters for the algorithm that are through put and all. The purpose of this article is to demonstrate the applications and use of the scheduling algorithm. During the load balancer review we have discussed about various load balancing algorithms and the issues related, service response time and improving performance. Different performance metrics are defined like response time, execution time waiting time, throughput etc. Future work can be done by exploring new load balancing algorithms which balances the load much better and also helps in green computing.

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